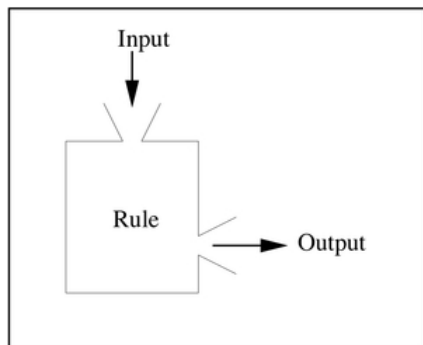


Illustrative Mathematics

8.F Function Rules

Alignment 1: 8.F.A.1

The function machine takes an input, does something to this input according to some rule and returns a unique output.



Given below are tables of input-output pairs for different function machines. Fill in the remaining table entries and describe each function rule in words.

- a. Input values can be any English word.

input	cat	house	you				
output	1	3	2				

- b. Input values can be any real number.

input	2	5	-1.5				
output	7	10	3.5				

- c. Input values can be any whole number between 1 and 365.

input	25	365	35	95	330		
output	January	December	February	April	November		

Commentary:

This task can be played as a game where students have to guess the rule and the instructor gives more and more input output pairs. Giving only three input output pairs might not be enough to clarify the rule. Instructors might consider varying the inputs in, e.g., the second table, to provide non-integer entries. A nice variation on the game is to have students who think they found the rule supply input output pairs and the teachers confirms or denies that they are right.

Verbalizing the rule requires precision of language. For the first part, only vowels a, e, i, o, u are counted. In the third example, we are looking at a non-leap year.

This task can be used to introduce the idea of a function as a rule that assigns a unique output to every input.

Solution: Solution

- a. Seeing that the input values can be any English word, we find the rule to be “the number of vowels” in the input word, and we designate that a vowel here is defined as *a, e, i, o, u*, but not *y*, as our input of “you” has an output of 2, not 3. Below is one possible way to complete the table.

input	cat	house	you	table	fireplace	sky	picture
output	1	3	2	2	4	0	3

- b. To find the rule, we find the common math operation between the pairs of numbers. We can conclude that our rule here is to “add 5” to the input value. Below is one possible way to complete the table.

input	2	5	-1.5	7	-3	3.285	0
output	7	10	3.5	12	2	8.285	5

With only three input output pairs we can probably come up with many other functions, but the rule of the game is that the teacher has a function rule in mind and gives more and more input output pairs until the students guess the teacher’s function.

- c. Since our input values here are numbers, but our output values are months of the year, we find that the rule here is “the month corresponding to that day out of the year”, defining January 1st to be day one. We can also assume we are using a non-leap year to determine the output values. Below is one possible way to complete the table.

input	25	365	35	95	330	123	200
output	January	December	February	April	November	May	July



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